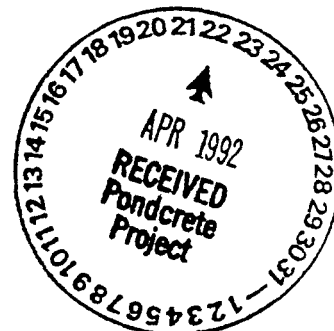




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ENVIRONMENTAL TECHNOLOGIES GROUP
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April 10, 1992



Mr. John R. Zak
Brown & Root, Inc.
1500 City West Boulevard
3rd Floor
Houston, Texas 77042

Subject: Operating Parameters for Pond 207C Processing
RF-HED-92-0185

Dear Mr. Zak:

Enclosed is the operating parameters which should be used for developing the mass balances for 207C Pond processing (REVISION 1). Generally this data is supported by complete laboratory analysis developed during the Treatability Study. As denoted in the attachment, some of the data is still ongoing.

For purposes of the mass balance calculations, the same ratios of water: pozzolanic ratios should be used for the B Pond processing train. The normal percent solid for dewatered sludges should be 20% with a range from 15-25%.

The attachment is being incorporated into the draft PCP philosophy which will be presented to EG&G during discussions on April 13, 1992. We will apprise you of any changes that may occur to these ranges as laboratory analysis is complete. It is anticipated that any changes to the operating parameters will increase the size of the envelope from those shown in the attachment.

Sincerely,

HALLIBURTON NUS ENVIRONMENTAL
CORPORATION

Ted A. Bittner
Project Manager

TAB/jg

cc: D. Brenneman
D. Ferrier
H. Harvey

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Hearst*

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RF-HED-92-0185

OPERATING ENVELOPE FOR 207C/CLARIFIER

To produce a certifiable product, the stabilization operation has to be conducted within a process operating envelope which has been proven in the laboratory. Halliburton NUS has developed recipes that have passed all Land Disposal Restrictions (TCLP) and Department of Transportation requirements. In addition to meeting the regulatory requirements, the cited recipes have also passed durability tests using ASTM wet/dry and freeze/thaw procedures.

These recipes are based on a specified amount of pozzolans to be added to the waste stream such that the ratio of free water to pozzolans falls within a certain regime. Free water has been defined as the total mass of water in the slurry less the total solids. The pozzolans are to be pre-blended in a fixed ratio of cement to flyash to lime. Pozzolans are defined in the context of this process as mixtures of cement, flyash and lime which when combined with water in the correct ratio forms a solidified waste product. The other two parameters that are necessary to provide a complete definition of the operating envelope are the TS (Total Solids), TDS (Total Dissolved Solids) and TSS (Total Suspended Solids) of the feed stream.

Sample Calculation of Pozzolan Requirement:

For a slurry with:

$$\text{TS (Total Solids)} = 32\%$$

$$\text{Free water} = 100 - \text{TS} = 100 - 32 = 68\%.$$

If the target is:

$$\text{Free Water} \div \text{Pozzolans} = 0.42,$$

For 100 grams of slurry, the amount of Pozzolans that have to be added would be:

$$\text{Pozzolans} = \text{Free Water} \div 0.42 = 68 \text{ gms} \div 0.42 = 161.9 \text{ gms}.$$

Pozzolans would be pre-blended in the cement:flyash:lime ratios indicated in the recipes.

Pond 207C Slurry

The recipes for stabilization of the contents of Pond 207C which meet all requirements are summarized in Table 1.

TABLE 1
RECIPE FOR POND 207C (HIGH TDS)

Water/Pozzolan Ratio	0.38 to 0.50
Upper Limit for TDS	35%
Upper Limit for TSS	3%
Pozzolan Composition: Cement:Flyash:Lime	1:2:0.075

Since the above recipes were developed, further testing is being conducted. The recipe being tested is provided in Table 2.

TABLE 2
RECIPE FOR POND 207C (HIGH TSS)

Water/Pozzolan Ratio	0.34 to 0.50
Upper Limit for TDS	32%
Upper Limit for TSS	11.3%
Pozzolan Composition: Cement:Flyash:Lime	1:2:0.075

Although the results of these tests are not available at present, the above recipes are expected to be successful.

Pond 207C/Clarifier Mix

Recipes are also being developed for a composite mixture of 207C slurry and clarifier contents. Clarifier sludge (containing 36% TSS) was added to 207C water (containing 5.6% TSS) such that the clarifier sludge makes up 19% by weight of the composite¹. The recipe being tested is summarized in Table 3.

**TABLE 3
RECIPE FOR 207C/CLARIFIER**

Water/Pozzolan Ratio	0.34 to 0.50
Upper Limit for TDS	27.3%
Upper Limit for TSS	11.4%
Pozzolan Composition: Cement:Flyash:Lime	1:2:0.075

These formulations (Table 2 & Table 3) are expected to be successful based on what has been learned from the stabilization testing conducted to date. Final confirmation (certifiable data) of the performance of the mixes being tested will be available by mid-June. Preliminary data (TCLP and UCS) will be available by the end of April.

All the recipes provide a range over which the water to pozzolan ratio can be varied and still produce a certifiable product. The operating target could be the mid-point of these ranges. However it might be preferable to pick a target water to pozzolan ratio which is 0.01 or 0.02 below the mid-point. Although this would mean a higher consumption of pozzolans, it would provide for equipment reaction times, thereby facilitating process operation within the defined envelope.

**TABLE 4
NORMAL OPERATING PARAMETERS (ENVELOPE) FOR POND 207C**

Free Water in slurry	57-100%
TDS [*]	0-35%
TSS [*]	0-11.3%

¹The addition of 19% by weight of clarifier sludge (at 36% TSS) to the 207C slurry (at 5.6% TSS) should yield a net TSS of approximately 11.4%.

TABLE 5
NORMAL OPERATING PARAMETERS (ENVELOPE) FOR POND 207C/CLARIFIER

Free Water in slurry	61-100%
TDS*	0-27.3%
TSS*	0-11.4%

* Relationship exists between the maximum TDS and TSS concentrations allowable (See Tables 1, 2, & 3)

When the recipes were formulated, lime was added such that it made up 1.4% by weight of the final product. The decision was made to pre-blend the lime into the pozzolan mixture. This lime concentration in the current recipes is sufficient to satisfy the TCLP requirement within the operating envelope. Within the operating parameters identified in Table 4 and 5, fluctuations in the water content of the slurry will have negligible impact on the total lime content of the product.

It is expected that Table 2 and 3 are the process operating envelopes under the two processing scenarios currently envisioned. These are based on the "best professional judgement" of Halliburton NUS while awaiting the final results of the current tests.